<u>DOSING PUMP CONTROLLER</u>

The aim of this program is to provide a Customised Dosing Pump Controller with various selectable responses to the Raw Water Flow (Analogue Input 1) and the Feedback signal (Analogue input 2)

The Dosing Pump will start and stop as per the user configured digital input commands or the Elite Keypad controls, depending on the setup of the Elite.
The source of the speed setpoint for the Dosing Pump is manually selected from the Elite Screens. These options are always available to the Operator and are selected in the 'A' screens.

SPEED REFERENCE SOURCE

LOCAL   The Speed Reference is derived from the Elite Keyboard.
PID+AIN1   **The Speed Reference is derived from Analogue Input 1 but has a feedback trim applied to it by the PID controller.**
AIN1 ONLY   The Speed Reference is derived solely from Analogue Input 1.

SPEED REFERENCE FLOW DIAGRAM
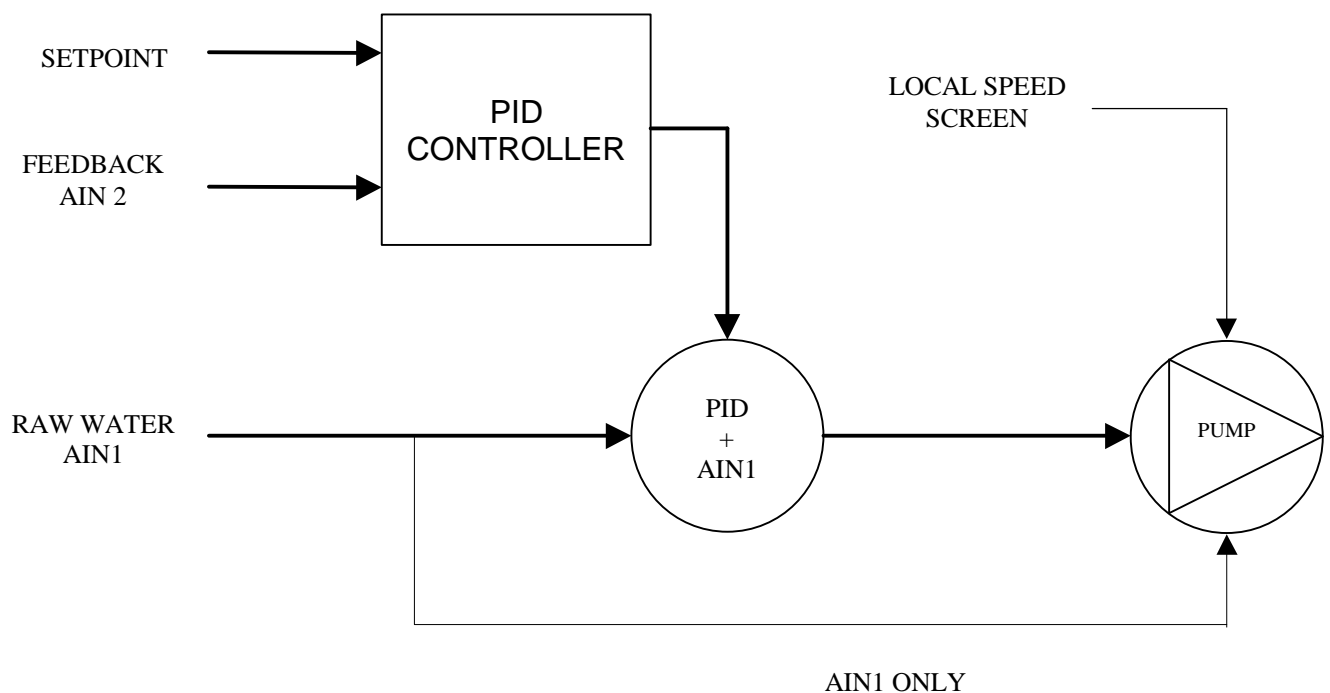
Normal Operation will be for the output of the PID controller to be added to the Raw Water flow signal to determine the Dosing Rate.
The Dosing Rate will increase with increasing Raw Water flow.
The PID trim will be to modulate the Dosing rate as a function of the feedback signal.
The Feedback signal will be displayed in percent (0-100%) and the Setpoint will be in percent (0-100%).

Alternate configurations are as indicated previously. *These alternate configurations are selected by the operator via the keypad, not remotely via the digital inputs.*

DOSING RATE RESPONSE TO RAW WATER SIGNAL ONLY
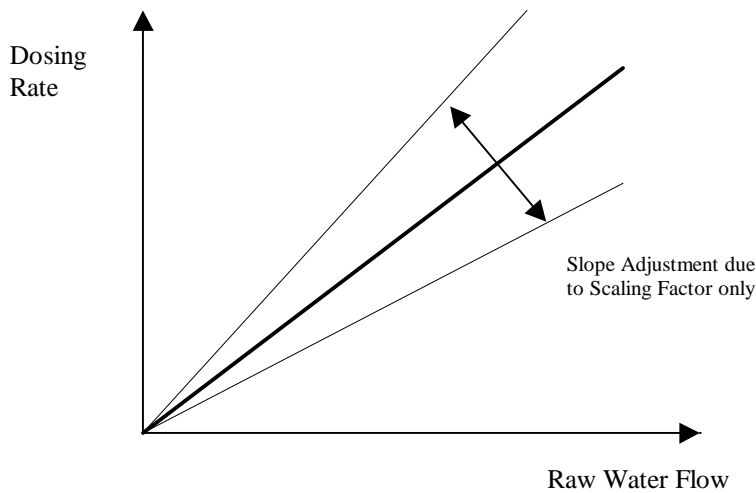
The analogue inputs can be fully scaled while the Elite is in Commissioning Mode, however, while in Normal Mode these adjustments are not available to the operator. For ease of adjustment of the slope of the response, a Scaling Factor screen has been included which only allows the slope of the graph to be adjusted by the operator. This means the operator cannot inadvertently invert the response or create a large zero error. This applies to any of the configurations that use AIN1 as a base for the Speed Reference.

The Vista logic highlights a number of important programming rules on using a Vista PID block.

1. The Vista PID integrator, unlike the standard program integrator, can not be turned off without additional logic. Selecting 1001 in screen P4 turns the integrator off in this program. To achieve this the integral feedback must be zero and the PID block must be momentary disabled.

2. Integrator wind-up should be avoided in creating a correct integral feedback signal. This signal should be the output of the PID after any 'limiting action'. Example 'limiting actions' are current limit action, slip compensation, hitting the speed limits etc. For a PID loop controlling the speed reference, the output speed function block generally provides the correct integral feedback signal. The Dosing Pump Controller however uses the PID block as a trim by adding the output of the PID to a re-scaled analogue value. To create the correct integral feedback signal the re-scaled analogue value must be subtracted from the output speed.